## REMARKS

Applicant thanks the Examiner for examination of the application.

Please note the claim for priority under 35 USC § 119(e)(1) of the provisional application number 60/251,024 filed on 12/04/2000 was made on the "Utility Patent Application Transmittal" Form filed with the PTO on November 27, 2001. Please update the records to reflect the claim for priority.

The drawing have been amended to comply with 37 CFR 1.121(d). A copy of the proposed drawing correction is attached to avoid abandonment of the application. Examiner is requested to remove the objection of the drawings.

Claim 19 has been amended to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Specifically, the informality in the claim has been corrected as recommended by the Examiner.

The Examiner is requested to withdraw the rejection of independent claims 1 and 36 under 35 U.S.C. § 103(a) as being unpatentable over Mangelsdorf (U. S. Patent No. 6,018,364) in view of Shimaya et al. (U. S. Patent No. 5,579,049).

Amended Claim 1 recites:

> An image processing apparatus having offset and optical black correction circuit coupled to receive a control signal having a first and second phase and an optical black signal from a charge coupled device, comprising:
>
> a. a first circuit to sample the optical black signal at a predetermined reference voltage, the first circuit comprises
>
> i. a correlated double sampler,

ii. a first and second programmable gain amplifier, the first programmable gain amplifier coupled to the correlated double sampler,

iii. an adder coupled between the first and second programmable gain amplifiers, and

iv. an analog-to-digital converter coupled to the second programmable gain amplifier for converting the sampled signal into a digital signal;

b. a second circuit to correct the optical black offset coupled to the first circuit, wherein the second circuit couples between the adder and the second programmable gain amplifier to add the positive and negative difference to the optical black signal, the second circuit comprises

i. a reverse programmable gain amplifier coupled to the analog-to-digital converter to amplify the optical black level of the digital signal; and

ii. an integrator coupled to the reverse programmable gain amplifier to detect the optical black level of the digital signal; wherein the integrator couples to the adder.

Mangelsdorf teaches a black level correction circuit in Figure 12 that includes a correlated double sampler 71 connected to a adder 58. A first programmable gain amplifier 30 connects between an analog-to-digital 38 and the adder 58. A feedback loop includes a series connect switch 62, a summing block 64, a second programmable gain amplifier 140 and an integrator 66. The feedback loop couples between the first programmable gain amplifier 30 and the adder 58.

Mangelsdorf does not teach nor suggest "a second circuit to correct the optical black offset coupled to the first circuit" that includes a reverse programmable gain amplifier coupled to an integrator as is required by the amended Claim 1.

Moreover, Mangelsdorf does not teach nor suggest a first circuit that includes a correlated double sampler, a first and second programmable gain amplifier, and adder coupled as is required by the amended Claim 1.

Shimaya et al. teaches an electrical configuration of an imaging apparatus for imaging a document to output a video signal representing an image obtained by the imaging. Figure 1 discloses a charge coupled device 11 that connects to a correlated double sampler 12. A pre-amplifier 13 couples to the correlated double sampler 12.

Shimaya et al. does not teach nor suggest a first circuit that includes a correlated double sampler, a first and second programmable gain amplifier, and adder coupled as is required by the amended Claim 1.

Amended Claim 1 requires a first circuit including an adder coupled between the first and second programmable gain amplifier.

Furthermore, amended Claim 1 requires "a second circuit to correct the optical black offset coupled to the first circuit" that includes a reverse programmable gain amplifier coupled to an integrator.

The combination of Mangelsdorf and Shimaya et al. does not provide an apparatus with the required features of an image processing apparatus as required by amended Claim 1. The combination of Mangelsdorf and Shimaya et al. does not teach nor suggest a first circuit including an adder coupled between the first and second programmable gain amplifier as required by amended Claim 1. Moreover, the combination of Mangelsdorf and Shimaya et al. does not teach nor suggest "a second circuit to correct the optical black offset coupled to the first circuit" that includes a reverse programmable gain amplifier coupled to an integrator. Accordingly, it would be necessary to make modifications not taught in the prior art to combine the

references in the manner suggested by the Examiner. Thus, it would not have been obvious to one skilled in the art to combine the references in the manner suggested.

Moreover, since the combination of Mangelsdorf and Shimaya et al. does not show nor suggest the image processing apparatus of amended Claim 1, Claim 1 is unanticipated and unobvious over Mangelsdorf in view of Shimaya et al. as recited by Examiner.

Dependent claims 1-25 are also allowable as depending on allowable independent amended Claim 1 and including further limitations that distinguish over the art arranged as recited. Claim 2 provides that the first programmable gain amplifier includes a first and second sampling circuit, a differential amplifier and a first and second feedback circuit arranged as recited. Claim 3 provides that the first sampling circuit included a first and second sampling switch, a first sampling variable capacitor, a second sampling capacitor, a third feedback switch, a fourth feedback switch arranged as recited. Claim 4 provides that the first and second sampling switch closes on the first phase of the control signal and the third and fourth sampling switch closes on the second phase of the control signal. Claims 5, 8, 17, 20 at least provide claim differentiation. Claim 6 provides that the first feedback circuit includes a first and second feedback switch, a feedback capacitor and a third feedback circuit arranged as recited. Claim 7 provides that the first and second sampling switch closes on the first phase of the control signal, wherein the third sampling switch closed on the second phase of the control signal. Claim 9 provides that the first programmable gain amplifier includes a sampling circuit, an amplifier and a feedback circuit arranged as recited. Claim 10 provides that the sampling circuit includes a first and second sampling switch, a first sampling variable capacitor, a second

sampling capacitor, a third feedback switch, a fourth feedback switch arranged as recited. Claim 11 provides that the first and second sampling switch closes on the first phase of the control signal, wherein the third and fourth sampling switch closes on the second phase of the control signal. Claim 12 provides that the feedback circuit includes a first and second feedback switch, a feedback capacitor, and a third feedback switch arranged as recited. Claim 13 provides that the first and second sampling switch closes on the first phase of the control signal, wherein the third sampling switch closes on the second phase of the control signal. Claim 14 provides that the second programmable gain amplifier includes a first and second sampling circuit, a differential amplifier, a first and second feedback circuit arranged as recited. Claim 15 provides that the first sampling circuit includes a first sampling switch, a sampling variable capacitor, a second sampling switch arranged as recited. Claim 16 provides that the first sampling switch closes on the second phase of the control signal and the second sampling switch closes on the first phase of the control signal. Claim 18 provides that the first feedback circuit includes a first and a second feedback switch, a feedback capacitor, a third feedback switch arranged as recited. Claim 19 provides that the first and second sampling switch closes on the first phase of the control signal, wherein the third sampling switch closes on the second phase of the control signal. Claim 21 provides that the second programmable gain amplifier includes a sampling circuit, an amplifier, a feedback circuit arranged as recited. Claim 22 provides that the sampling circuit includes a sampling switch and a first sampling variable capacitor arranged as recited. Claim 23 provide that sampling switch closes on the second phase of the control signal. Claim 24 provides that the feedback circuit includes a first and a second feedback switch, a feedback capacitor, and a third feedback switch arranged as recited. Claim 25 provides that the

first and second sampling switch closed on the first phase of the control signal, wherein the third sampling switch closes on the second phase of the control signal.

Claim 36 recites:

> An image processing method comprising the steps of:
>
> converting a signal of reflected light off of an object photoelectrically to obtain an optical black signal;
>
> generating a predetermined reference voltage;
>
> clamping the optical black signal to a predetermined reference voltage;
>
> amplifying the optical black signal by a first gain of a first programmable gain amplifier;
>
> amplifying the optical black signal by a second gain of a second programmable gain amplifier;
>
> feeding back the amplified signal to a reverse programmable gain amplifier;
>
> amplifying the optical black signal by the inverse of the second gain; and
>
> adding the amplified optical black signal to the optical black signal after the first programmable gain amplifier.

Mangelsdorf teaches a black level correction circuit in Figure 12 that includes a correlated double sampler 71 connected to a adder 58. A first programmable gain amplifier 30 connects between an analog-to-digital 38 and the adder 58. A feedback loop includes a series connect switch 62, a summing block 64, a second programmable gain amplifier 140 and an integrator 66. The feedback loop couples between the first programmable gain amplifier 30 and the adder 58.

Following the aforementioned analysis of amended Claim 1, Mangelsdorf does not teach nor suggest a step of "amplifying the optical black signal by a first gain of a first programmable gain amplifier" in addition to a step of "amplifying the optical black signal by a second gain of a second programmable gain amplifier" as is required by the Claim 36.

Moreover, Mangelsdorf does not teach nor suggest "feeding back the amplified signal to a reverse programmable gain amplifier" as is required by the amended Claim 36.

Shimaya et al. teaches an electrical configuration of an imaging apparatus for imaging a document to output a video signal representing an image obtained by the imaging. Figure 1 discloses a charge coupled device 11 that connects to a correlated double sampler 12. A pre-amplifier 13 couples to the correlated double sampler 12.

Shimaya et al. does not teach nor suggest a step of "amplifying the optical black signal by a first gain of a first programmable gain amplifier" in addition to a step of "amplifying the optical black signal by a second gain of a second programmable gain amplifier" as is required by the Claim 36.

Claim 36 requires a step of "amplifying the optical black signal by a first gain of a first programmable gain amplifier" in addition to a step of "amplifying the optical black signal by a second gain of a second programmable gain amplifier".

Furthermore, Claim 36 requires a step of "feeding back the amplified signal to a reverse programmable gain amplifier".

The combination of Mangelsdorf and Shimaya et al. does not provide the method with the required features of an image processing method as required by Claim 36. The combination of Mangelsdorf and Shimaya et al. does not teach nor suggest a step of "amplifying the optical black signal by a first gain of a first programmable gain amplifier" in addition to a step of "amplifying the optical black signal by a second gain of a second

programmable gain amplifier" as required by Claim 36. Moreover, the combination of Mangelsdorf and Shimaya et al. does not teach nor suggest a step of "feeding back the amplified signal to a reverse programmable gain amplifier" as required by Claim 36. Accordingly, it would be necessary to make modifications not taught in the prior art to combine the references in the manner suggested by the Examiner. Thus, it would not have been obvious to one skilled in the art to combine the references in the manner suggested.

Moreover, since the combination of Mangelsdorf and Shimaya et al. does not show nor suggest the image processing method of Claim 36, Claim 36 is unanticipated and unobvious over Mangelsdorf in view of Shimaya et al. as recited by Examiner.

The Examiner is requested to withdraw the rejection of claims 2, 9, 14, 17, 19-23, 26, 29, 30, 31, 32, and 35 under 35 U.S.C. § 103(a) as being unpatentable over Mangelsdorf (U. S. Patent No. 6,018,364) in view of Shimaya et al. (U. S. Patent No. 5,579,049) and further in view of Domer et al. (U.S. Patent No. 6,346,968).

Domer et al. teaches a schematic diagram of a programmable gain amplifier, having a switched capacitor pipelined programmable gain stage that includes an amplifier 302, fixed capacitors 310-311, programmable capacitors 320 and 330 and switches 314, 315, 316, 317, 323-324 and 333-334 as is shown in Figure 3 of the Specification.

Following the aforementioned analysis for amended Claim 1, although Domer et al teaches a programmable gain amplifier, having a switched capacitor pipelined programmable gain stage, the combination of Mangelsdorf, Shimaya et al., and Domer et al.

does not provide an apparatus with the required features of an image processing apparatus as required by Claims 2, 9, 14, 17, and 19-23. The combination of Mangelsdorf, Shimaya et al., and Domer et al. does not teach nor suggest a first circuit including an adder coupled between the first and second programmable gain amplifier as required by Claims 2, 9, 14, 17, and 19-23. Moreover, the combination of Mangelsdorf, Shimaya et al., and Domer et al. does not teach nor suggest "a second circuit to correct the optical black offset coupled to the first circuit" that includes a reverse programmable gain amplifier coupled to an integrator. Accordingly, it would be necessary to make modifications not taught in the prior art to combine the references in the manner suggested by the Examiner. Thus, it would not have been obvious to one skilled in the art to combine the references in the manner suggested.

Moreover, since the combination of Mangelsdorf, Shimaya et al., and Domer et al. does not show nor suggest the image processing apparatus of Claims 2, 9, 14, 17, and 19-23, Claims 2, 9, 14, 17, and 19-23 is unanticipated and unobvious over Mangelsdorf in view of Shimaya et al. and further in view of Domer et al. as recited by Examiner.

Amended Claim 26 recites:

> An image processing apparatus having offset and optical black correction circuit coupled to receive a control signal having a first and second phase and an optical black signal from a charge coupled device, comprising:
>
> a first circuit to sample the optical black signal at a predetermined reference voltage, the first circuit comprises:
>
> a correlated double sampler,
>
> a first and second programmable gain amplifier, the first programmable gain amplifier coupled to the correlated double sampler, and
>
> an adder coupled between the first and second programmable gain amplifiers, wherein the correction

circuit couples to the adder to add the positive and negative difference to the optical black signal;

an analog-to-digital converter coupled to the second programmable gain amplifier for converting the sampled signal into a digital signal; and

a second circuit to correct the optical black offset coupled to the first circuit, the second circuit comprises:

a first and second sampling circuit,

a differential amplifier having a first and second input and a first an second output, the first sampling circuit coupled to the first input, the second sampling circuit coupled to the second input, and

a first and second feedback circuit, the first feedback circuit coupled between the first input and the first output, the second feedback circuit coupled between the second input and the second output.

Mangelsdorf does not teach nor suggest "an adder coupled between the first and second programmable gain amplifiers, wherein the correction circuit couples to the adder to add the positive and negative difference to the optical black signal" as is required by the Claim 26.

Moreover, Mangelsdorf does not teach nor suggest a second circuit that includes first and second sampling circuit, a differential amplifier, and a first and second feedback circuit coupled as is required by the amended Claim 26.

Shimaya et al. does not teach nor suggest "an adder coupled between the first and second programmable gain amplifiers, wherein the correction circuit couples to the adder to add the positive and negative difference to the optical black signal" as is required by the amended Claim 26.

Amended Claim 26 requires a first circuit including an adder coupled between the first and second programmable gain amplifier.

Furthermore, amended Claim 26 requires a second circuit that includes first and second sampling circuit, a differential amplifier, and a first and second feedback circuit.

Following the aforementioned analysis, although Domer et al teaches a programmable gain amplifier, having a switched capacitor pipelined programmable gain stage, the combination of Mangelsdorf, Shimaya et al., and Domer et al. does not provide an apparatus with the required features of an image processing apparatus as required by amended Claim 26. The combination of Mangelsdorf, Shimaya et al., and Domer et al. does not teach nor suggest a first circuit including an adder coupled between the first and second programmable gain amplifier as required by amended Claim 26. Moreover, the combination of Mangelsdorf, Shimaya et al., and Domer et al. does not teach nor suggest a second circuit that includes first and second sampling circuit, a differential amplifier, and a first and second feedback circuit. Accordingly, it would be necessary to make modifications not taught in the prior art to combine the references in the manner suggested by the Examiner. Thus, it would not have been obvious to one skilled in the art to combine the references in the manner suggested.

Moreover, since the combination of Mangelsdorf, Shimaya et al., and Domer et al. does not show nor suggest the image processing apparatus of amended Claim 26, Claim 26 is unanticipated and unobvious over Mangelsdorf in view of Shimaya et al. and further in view of Domer et al. as recited by Examiner.

Dependent claims 29, 30, and 31 are also allowable as depending on allowable independent amended Claim 26 and including

further limitations that distinguish over the art arranged as recited. Claims 29 and 31 at least provides claim differentiation. Claim 30 provides that the first feedback circuit comprised a feedback capacitor.

Claim 32 recites:

> An image processing apparatus having offset and optical black correction circuit coupled to receive a control signal having a first and second phase and an optical black signal from a charge coupled device, comprising:
>
> a first circuit to sample the optical black signal at a predetermined reference voltage, the first circuit comprises
>
> a correlated double sampler,
>
> a first and second programmable gain amplifier, the first programmable gain amplifier coupled to the correlated double sampler, and
>
> an adder coupled between the first and second programmable gain amplifiers, wherein the correction circuit couples to the adder to add the positive and negative difference to the optical black signal;
>
> an analog-to-digital converter coupled to the second programmable gain amplifier for converting the sampled signal into a digital signal;
>
> a second circuit coupled to the first circuit to correct the optical black offset, the second circuit comprises:
>
> a sampling circuit;
>
> an amplifier having an input and an output, the sampling circuit coupled to the input; and
>
> a feedback circuit coupled between the input and the output, the feedback circuit coupled to the adder.

Mangelsdorf does not teach nor suggest "an adder coupled between the first and second programmable gain amplifiers, wherein the correction circuit couples to the adder to add the positive and negative difference to the optical black signal" as is required by the Claim 32.

Moreover, Mangelsdorf does not teach nor suggest a second circuit that includes a sampling circuit, an amplifier and a feedback circuit coupled as is required by the Claim 32.

Shimaya et al. does not teach nor suggest "an adder coupled between the first and second programmable gain amplifiers, wherein the correction circuit couples to the adder to add the positive and negative difference to the optical black signal" as is required by the amended Claim 32.

Amended Claim 32 requires a first circuit including an adder coupled between the first and second programmable gain amplifier.

Furthermore, Claim 32 requires a second circuit that includes a sampling circuit, an amplifier and a feedback circuit.

Following the aforementioned analysis, although Domer et al teaches a programmable gain amplifier, having a switched capacitor pipelined programmable gain stage, the combination of Mangelsdorf, Shimaya et al., and Domer et al. does not provide an apparatus with the required features of an image processing apparatus as required by Claim 32. The combination of Mangelsdorf, Shimaya et al., and Domer et al. does not teach nor suggest a first circuit including an adder coupled between the first and second programmable gain amplifier as required by Claim 32. Moreover, the combination of Mangelsdorf, Shimaya et al., and Domer et al. does not teach nor suggest a second circuit that includes a sampling circuit, an amplifier, and a feedback circuit. Accordingly, it would be necessary to make modifications not taught in the prior art to combine the references in the manner suggested by the Examiner. Thus, it would not have been obvious to one skilled in the art to combine the references in the manner suggested.

Moreover, since the combination of Mangelsdorf, Shimaya et al., and Domer et al. does not show nor suggest the image processing apparatus of Claim 32, Claim 32 is unanticipated and unobvious over Mangelsdorf in view of Shimaya et al. and further in view of Domer et al. as recited by Examiner.

Dependent claim 35 is also allowable as depending on allowable independent amended Claim 32 and including further limitations that distinguish over the art arranged as recited. Claim 35 provides that the first feedback circuit comprised a feedback capacitor.

Claims 1-36 stand allowable.

This Amendment, submitted in response to the outstanding office action dated November 2, 2004, is believed fully responsive to each point of objection or rejection raised therein.

The Claims 1 - 36 distinguish over the cited references and the application is in allowable form. Applicant respectfully requests reconsideration or further examination and allowance of the application.

Respectfully submitted,

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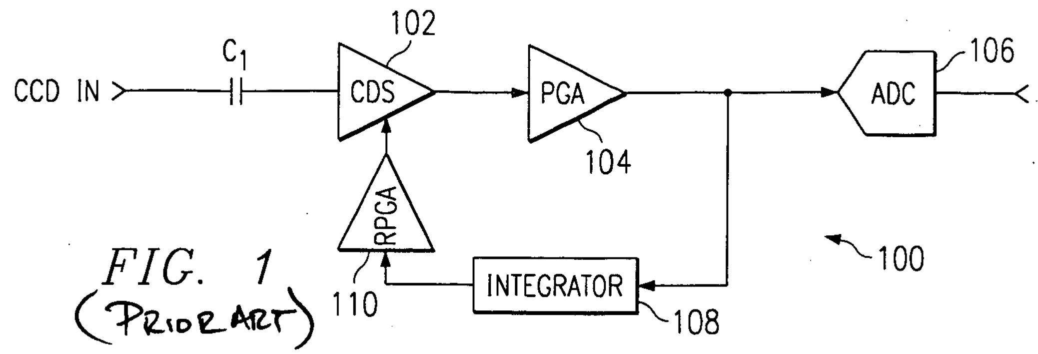


FIG. 1
(PRIOR ART)

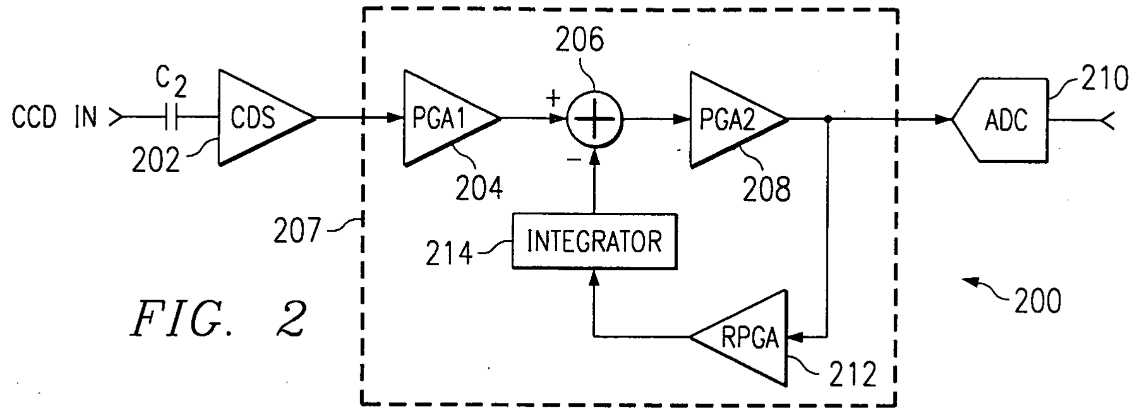


FIG. 2

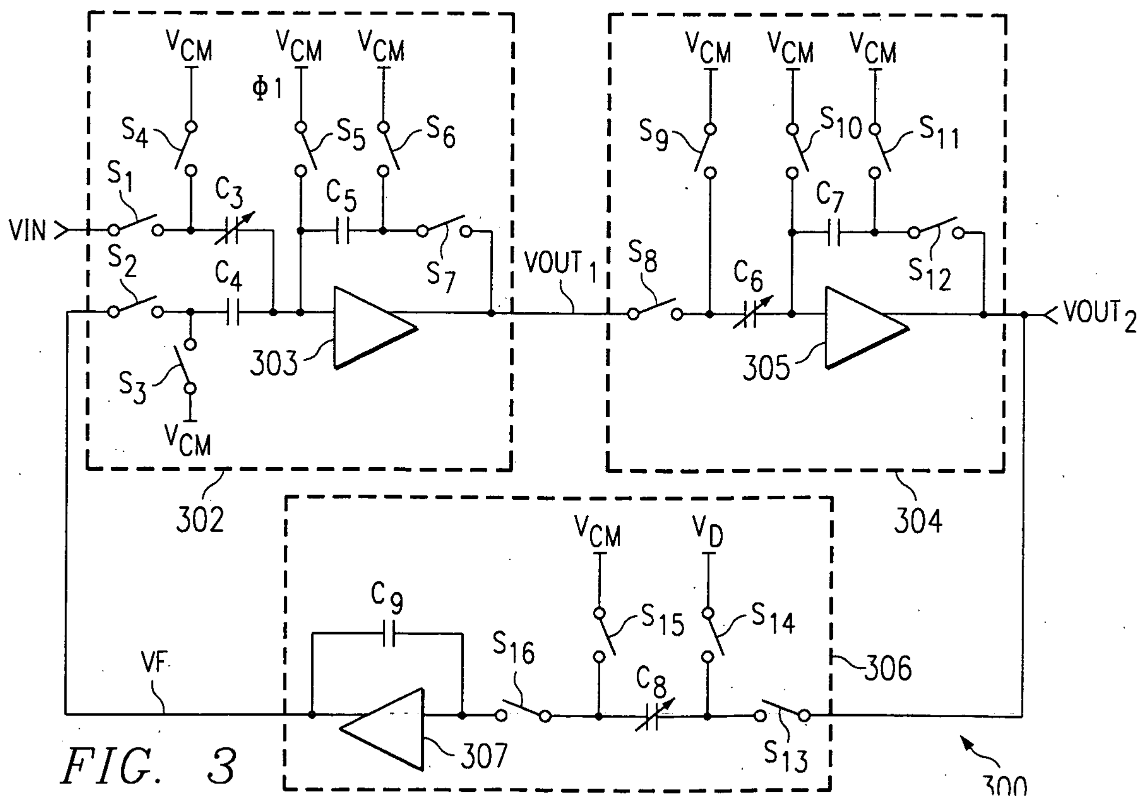


FIG. 3